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SPECIFIC ENTITIES OF THE SUBGENUS *ICARICIA* NABOKOV (LYCAENIDAE)

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ICARICIA WAS PROPOSED by Nabokov in 1945 with *Lycaena icarioides* Boisduval as the type. It is currently treated as a subgenus of *Plebejus* Kluk 1802. Of the names included under *Icaricia*, there has been some difference of opinion as to which should be treated as full species and which should be given less than specific status. The purpose of this paper is to give one point of view on this problem.

In arriving at the following conclusions, information derived from examination of male genitalia, color and markings of the adults, distribution, phenology, sympatry and food plant choices have been taken into consideration.

This study was begun some time ago, and there has been a free exchange of ideas with a number of other workers, most especially with Dr. Harry K. Clench and Mr. Carll Goodpasture. There are certain populations that seem to merit recognition at the subspecific level, which so far have remained unnamed. The naming of these populations is left to Dr. Clench.

The findings of the author and of Dr. Clench are in general agreement, differing only in minor details. However, the author takes sole responsibility for the opinions stated in this paper, which is being presented at this time to reinforce certain other forthcoming work.

All of the members of the subgenus *Icaricia* have male genitalia of a similar type. Certain members of the genus *Philotos* resemble members of *Icaricia* quite closely. In addition to distinctively different male genitalia, these members of *Philotos* have checkered fringes, and lack metallic scales in the aurora. Members of *Icaricia* all have plain unchecked fringes, and with the exception of *icarioides*, have metallic scales in the aurora on the under side of the hind wings.

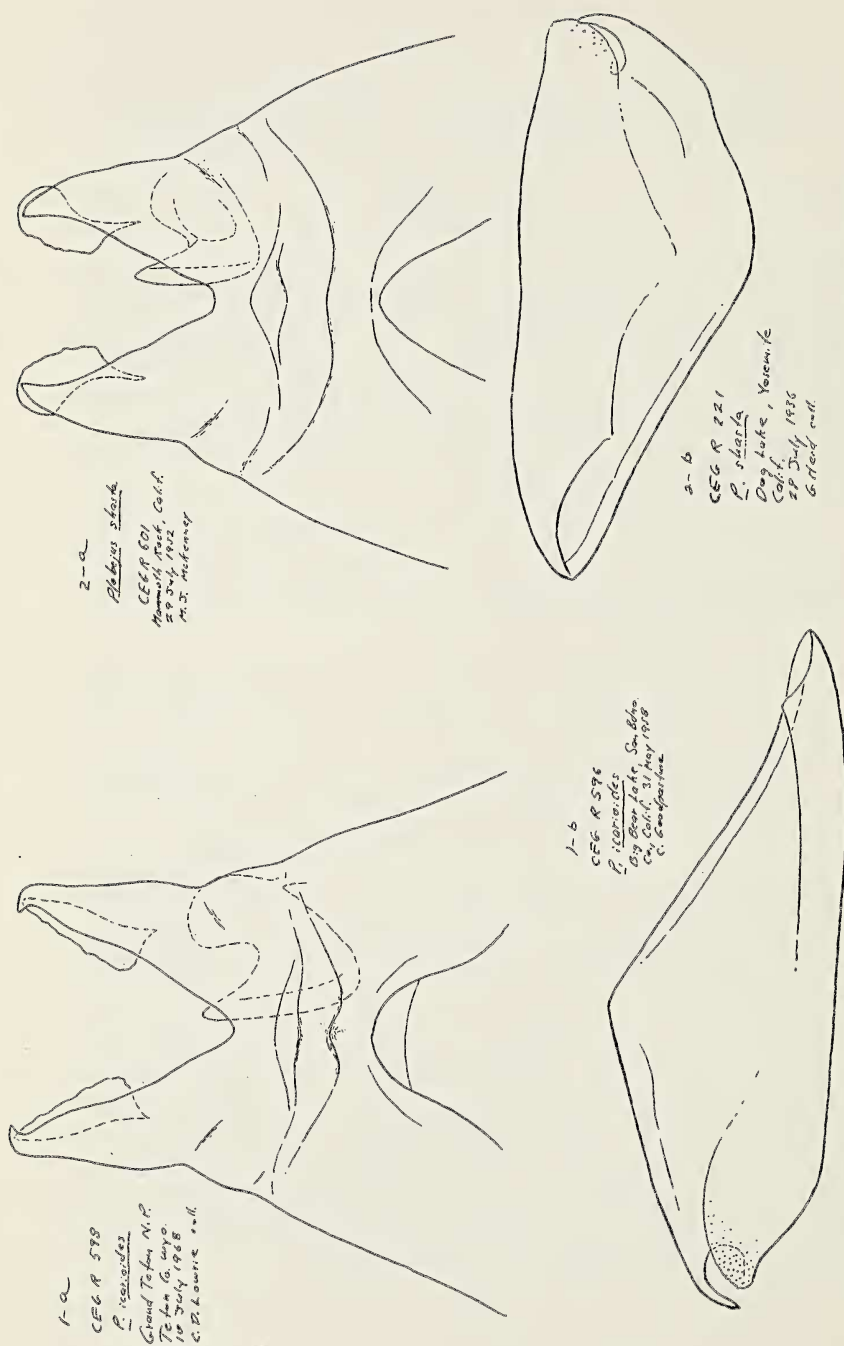


Fig. 1.—Male genitalia, *P. icartoides* Bdv. (a) dorsal view of uncus and left falx, (b) inner face of left valve.

Fig. 2.—Male genitalia, *P. Shasta* Edw. (a) and (b) as in Fig. 1.

As considered here, the subgenus consists of five species. Each is considered below.

Plebejus (Icaricia) icarioides (Boisduval) 1852

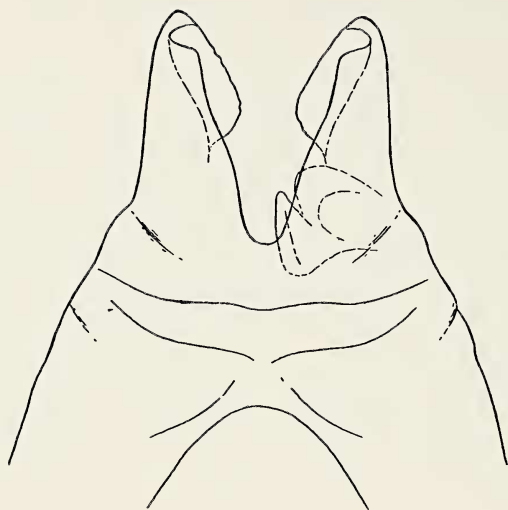
Ann. Soc. ent. France (2) 10:297 (TL "California")

This, the type of the subgenus, differs most in appearance from the other species associated with it. It is the largest in alar expanse and the least ornamented in its markings. It has a wide range in western North America, and is tolerant of both latitude and elevation. Suitable food plants for *icarioides* are unevenly distributed, which may account at least in part for the somewhat colonial habits of this species, which has developed a large number of relatively isolated populations. Many of these populations have evolved more or less distinctive differences in appearance. A number of these populations have received names, which are currently considered either synonyms or as valid at the subspecific level. For a continuing analysis of the variation of *Plebejus icarioides*, the reader is referred to the papers of Dr. John C. Downey.

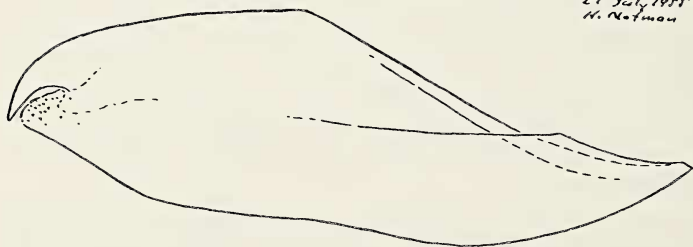
All populations of *icarioides* agree in having the males of some more or less uniform shade of blue above, nearly unmarked. The forewing cell bar is faint to slightly evident. The veins appear slightly lighter than the ground color. The borders are moderate to narrow, a bit wider on the forewing. The position of the aurora may be indicated by some small dark dots. UNF, the cell bar and post median spots are well developed. The markings of the hind wing below differ greatly from population to population and together with the ground color, form one of the prime characters by which the populations differ in appearance. Females may be entirely dark above, or more or less blue, depending on the population. The cell-end bars are often evident and the aurora may be indicated by a few light scales.

Male genitalia: the uncus lobes are pointed and dentate at the tips, and separated by a wide cleft. The terminal lobe (forearm) of the falx is both longer and wider than the basal lobe. The valve is long and narrow, tapering to the point of attachment. The inner rolled edge (sacculus) is relatively narrow. (Figs. 1-a, 1-b).

There seems to be no good reason for regarding *pardalis* Behr, 1867, and *pheres* Boisduval, 1852, as species distinct from



3-a
Plebejus acmon
 CEG R 577
 Montezello Dam, Yolo Co.
 Calif. 29 April, 1970
 C. Goodpasture



3-b
 CEG R 322 *P. acmon*
 Topanga, L. A. Co. Calif.
 27 July, 1955
 H. Netman

Fig. 3.—Male genitalia, *P. acmon* West. and Hew. (a) and (b) as in Fig. 1.

icarioides. *Pardalis* represents an unusually heavily marked population (TL, "Contra Costa Coast Range, in the vicinity of San Antonio," near the present Lake Merritt). *Pheres* Boisduval was an exceptionally lightly marked population, formerly found in the sand dunes of San Francisco, now apparently extinct. Somewhat similar appearing populations found in Marin County are by no means identical, and in my estimation should not be referred to as *pheres*.

Food plants of *icarioides* are various Lupines (*Lupinus* spp.), apparently only perennial species, and not all of these. In the San Francisco Bay region, *Lupinus chamissonis* is often selected. *P. icarioides* seems to be univoltine throughout its range.

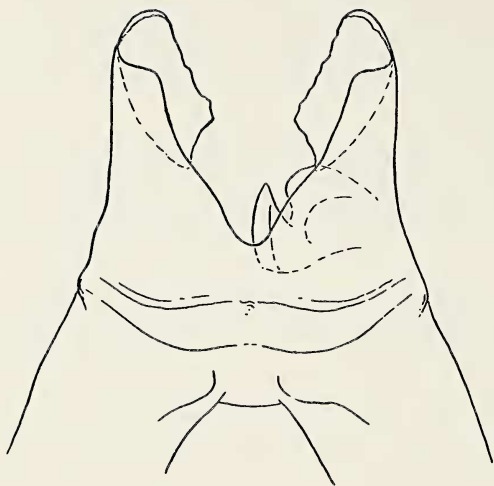
Plebejus (Icaricia) shasta (Edwards) 1862

Proc. Acad. Nat. Sci. Philad. 224:1862. (TL, "California," restricted by F. M. Brown (1970, 402-403) to the southwest side of Sheppard Pass, Tulare Co., Calif.).

A small species, the males duller blue above than their congeners, the dark borders unusually wide and grading into the ground color. The cell-end bars are evident on both pairs of wings. UNH, the aurora is of metallic spangles only, nearly or quite without red or orange. The females bear a general resemblance to the males except for duller coloration.

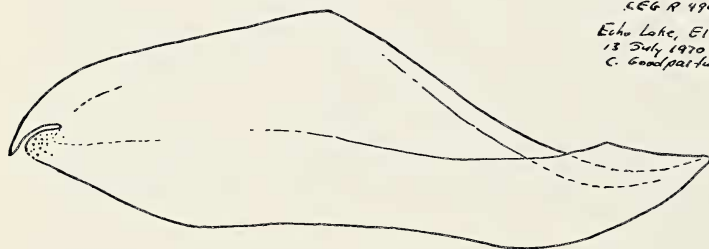
Male genitalia: The uncus lobes are not pointed but end as do those of all the species except *icarioides*, each in a quadrate-concave inward-facing structure. In *shasta* this is short and wide. The uncus lobes are separated by a wide and relatively shallow cleft. The forearm of the falx is longer than the basal lobe, and is somewhat pointed distally. The valve is broader than that of the other members of the group, a character which alone will usually identify the species. It is, however, subject to variation, and occasional individuals will be found that have the valve much narrower than the norm. (Figs. 2-a, 2-b).

Over much of its range *shasta* is a high-montane species. However, in the Sierra Nevada of California and in the Cascades of California and Oregon, there are localities where *shasta* occurs at intermediate elevations. Specimens from these lower elevations do not seem to differ markedly from those of higher elevations. Material from the very highest localities in the Rocky Mountains is distinctively dull and dwarfed, and represents *P. (I.) browni* Ferris 1970, (= *minnehaha* auct., not Scudder 1775). The name *comstocki* Fox 1925, based on



4-a
CEG R 479

P. lupini
Echo Lake, El Dorado Co.
Calif. 13 July 1970
C. Goodpasture



4-b
CEG R 484 *P. lupini*
Echo Lake, El Dorado Co. Calif.
13 July 1970
C. Goodpasture

Fig. 4.—Male genitalia, *P. lupini* Bdv. (a) and (b) as in Fig. 1.

material from Glacier Point, Yosemite National Park, Calif., was given to a phenotype in which the white scaling of the underside is greatly reduced or absent. Normal white-scaled individuals occur both north and south of the type locality of *comstocki*. In fact, individuals with reduced white scaling can be selected from almost any series of nominate *shasta*.

The food plant was until recently unknown, in spite of the relative abundance of the species. Recently observed to oviposit on *Trifolium* (Clover) by Oakley Shields in California, and by James Scott in Colorado. To date, the details of their observations have not appeared in print. *P. shasta* is apparently univoltine throughout its range.

Plebejus (Icaricia) acmon (Westwood & Hewiston) 1852

Gen. diurn. Lep., pl. 76, + p. 494, no. 139. (TL "California").

A small species, the males usually pale blue above with a pinkish aurora which is overlaid with the same iridescence as the rest of the surface. The veins are concolorous, the borders narrow, the end-cell bar usually absent. Females are often brown with conspicuous orange aurora, the borders not contrasting with the dark ground color. But more or less blue females occur, often in the same population with dark ones.

Male genitalia: Terminal quadrate part of uncus lobes short and narrow, and separated by a deep, narrow cleft. The forearm of the falx is much shorter than the basal lobe. The valve is less slender and tapering than that of *icarioides*, less broad than that of *shasta*. (Figs. 3-a, 3-b).

P. acmon is widely distributed in western North America and is found over a wide range of climatic conditions. It is multivoltine at lower elevations. The number of broods per year seems to depend on the length of a suitable reproductive season. Whether it may be single-brooded at high elevations is not known, at least partly because of confusion with the following species.

The known food plants are several and include *Lotus* (*Hosackia*, *Acmispon*) and *Astragalus*. Other legumes such as *Trifolium*, *Medicago* (Bur Clover, Alfalfa), *Melilotus alba* (Sweet Clover) and *Lupinus* have been reported or suggested. *Acmon* is also known to feed on certain species of *Eriogonum*, including the *E. latifolium* and *E. fasciculatum* complexes.

P. acmon and the next species, *P. lupini*, are widely sympatric. *P. lupini* occurs in some lowland localities where it

was previously thought that only *P. acmon* occurred. And conversely, it appears that *P. acmon* occurs at high elevations in some places where only *P. lupini* was previously believed to exist. Whether *cottlei* Skinner 1902 (TL San Francisco, Calif.) and *lutzi* dos Passos (TL Snowslide Canyon, 8 miles from Montpelier, Idaho), should be associated with *acmon* or with *lupini* may depend ultimately on a genitalic examination of the type material.

Plebejus (Icaricia) lupini (Boisduval) 1852

Ann. Soc. ent. Belg. 12: (TL "California....").

Usually larger than *acmon*, except the high-montane and northern populations of the two species may approach one another in size. Males, purplish-blue above, the dark borders wide and grading into the ground color. The veins may be slightly darker than the ground color and the end-cell bar of the forewings is often evident. The dark border is usually edged inwardly by light scales, giving a light "echo" or "phantom edge" internal to the dark border. This seems to be a distinctive character in this species. The aurora is orange-red and often formed of crescentic markings that cap the black spots. The females may be either blue or brown and have the aurora very prominent.

Male genitalia: The uncus lobes are flaring, the terminal quadrate areas much longer than wide. The cleft is wide and shallow. There are also minor but apparently constant differences in the falces and the valves. (Fig. 4-a, 4-b).

The food plants are shrubby species of perennial *Eriogonum*, including *E. fasciculatum*, *E. umbellatum*, and others. The specific name is a misnomer; it is not associated with *Lupinus*. *P. lupini* appears to be univoltine, but much remains to be learned about its food habits, due to long confusion with *P. acmon*.

P. lupini is broadly sympatric with *P. acmon* over much of both their ranges, a circumstance that has been the cause of much confusion. Both may occur at both low and high elevations and in many types of habitats. Some of the extreme variation seen in some series of specimens labelled as *P. acmon* is due to the presence of both species in the series. Some of the specimens that I have seen labelled as *cottlei* appear to belong with *lupini*. A genitalic examination of the type material of *cottlei* would be desirable, and would serve to fix the position of this name.

I have examined material from the Rocky Mountains, labelled as *lutzi* dos Passos, which appears to consist of both species mixed. Here again, genitalic examination of the type material of *lutzi* would be desirable to fix the position of this subspecies. Often *lupini* and *acmon* can be recognized by appearance, but in the last analysis the male genitalia offer the best means of separating these closely related but distinct species.

The population with green males, named *chlorina* by Skinner (TL Tehachapi, Kern Co., Calif.), shows some genitalic difference from nominate *lupini* in the shape of the superior process of the valve. This structural difference is also found in the Southern California population *monticola* Clemence (TL, by inference, San Gabriel Mountains, Los Angeles County, Calif.). *Monticola*, while distinctive in coloration, is in other respects very close to *chlorina*. *Chlorina* is found in the Tehachapi Mountains and south to the Mt. Pinos area, where it appears to intergrade to *monticola*. *Monticola* is found in pure form in the San Gabriel mountains and southward. It is possible that further study will show that the *chlorina-monticola* populations form a separate species. They are here regarded as well-marked subspecies of *lupini*.

A word about the Olympic Mountains population named *spangelatus* by Burdick (TL Gray Wolf Range, Olympic Mountains, Clallam County, Wash.). This was originally described as a subspecies of *lupini* (Burdick, 1942). On a reprint sent me by Burdick there is this penned notation: "Recent genitalic research indicates affiliation with *shasta* rather than *lupini*. / W. N. B." Material which I took in Olympic National Park and which I considered to be *spangelatus*, belongs genitally with *lupini*. This same material has been examined by Dr. Clench, who came to the same conclusion.

However, I have been informed by Mr. Carll Goodpasture that he has examined one of Burdick's paratypes and considers it to be genitally *acmon*. It appears that both *lupini* and *acmon* occur in the Olympic Mountains, and that Burdick may have had a mixed type series. The final decision on the affinities of *spangelatus* Burdick would appear to rest on a genitalic examination of the type, which is in the Canadian National Collection at Ottawa. In any event, the notation of Burdick to the contrary, it seems unlikely that the name *spangelatus* can be associated with *P. shasta*.

Plebejus (Icaricia) neurona (Skinner) 1902

Ent. News 13:15 (TL Doble, San Bernardino Co., Calif.)

This species, averaging the smallest in the subgenus, is unique in coloration, brown with orange veins in both sexes, entirely without blue.

Male Genitalia: Nearly or quite identical with *acmon*; there seem to be no constant differences.

Neurona is found in southern California, from Walker Pass in Kern County, southward in isolated colonies. The Mt. Pinos region of Los Angeles-Kern-Ventura Counties has a considerable concentration of the species. *Neurona* is apparently univoltine and is usually found in close proximity to its food plant, *Eriogonum Wrightii*. It is sympatric with *icarioides*, *lupini* (*chlorina*), and with *acmon*, at least in the Mt. Pinos region. The highly colonial distribution of *neurona* may be in part an artifact of incomplete collecting. On the other hand, I have seen rather extensive growth of *Eriogonum Wrightii* with no detectible *neurona* associated with it.

The unique coloration of *neurona*, a marked departure from that of the other members of the subgenus, and in fact, from that of the family, suggests that it has differentiated more recently than the other members of its group. The close structural relationship of *neurona* to *acmon* suggests also that *neurona* may have evolved from *acmon* in relatively recent times.

The illustrations are the work of Mr. Carll Goodpasture, to whom I am indebted for their use.

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